

The Potential of Facebook® for Communicating Complex Technologies Using the Example of Deep Geothermal Energy

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Abstract - Professional and transparent communication processes are crucial for the introduction of new complex technologies. In this context, the potential of social media applications such as Facebook has still to be investigated. Therefore, this paper addresses the potential of Facebook as an instrument in communicative measures for the acceptance of complex technologies taking deep geothermal energy as an example. Based on socio-scientific and linguistic approaches the special characteristics of Facebook as a communication and interaction environment and specific Facebook components are described. The description leads to a discussion about the opportunities and risks of using Facebook in communicative measures. Also, recommendations for the usage of specific Facebook components are given. The discussion shows that Facebook is suited for information as well as inclusion purposes. The Facebook components fan pages, groups and events can be applied as useful components in comprehensive communication strategies for complex technologies. The considerations and recommendations in this study are useful for communication professionals who develop and carry out communication concepts as well as for researchers who deal with Facebook in professional contexts.

Index Terms - Acceptance of geothermal projects, communicative activities, communication concept and measures, social networking sites

INTRODUCTION

The introduction and implementation of complex technologies entails challenges for different disciplines. Besides technological and economical issues, the

acceptance and communication of complex technologies such as deep geothermal energy have to be focused to further establish them. Studies show that one crucial factor for the perception and acceptance of relatively unknown and complex technologies is whether people are informed about the technology or not [1]. Furthermore, the early inclusion of citizens into the implementation process is important to build trust and acceptance [2]. Therefore, information and communication concepts are urgently needed.

One way to communicate with and inform people is the social networking site Facebook®. Facebook has become a central Internet platform, which is frequently used by a great amount of people: In Germany for instance, nearly 25 Million people (44% of all German Internet users) use Facebook [3], [4]. People spend much time on Facebook—on average 63 minutes per day [5]. They observe and discuss topics affecting their everyday life and local surroundings [4]. Up to now, little is known about the suitability of Facebook for communicative measures and strategies for communicating complex technologies such as deep geothermal energy. To investigate the potential of Facebook for this purpose, socio-scientific and linguistic approaches are combined in this study.

First, the research project and research case are introduced and the research questions are presented. Secondly, related work is briefly discussed and the specific conditions of communicating and interacting on Facebook are outlined using an approach of Boyd [6]. Afterwards, *fan pages*, *groups* and *events* are described from a linguistic perspective as instances of communicative forms. Based on the description, the opportunities and risks of using Facebook in communicative measures are discussed. Also, the usage

of *fan pages, groups* and *events* for communicating geothermal projects is examined and recommendations are given. The paper concludes with a discussion of limitations of the present study and prospects for future research.

PROJECT, RESEARCH CASE AND RESEARCH QUESTIONS

This case study is part of the interdisciplinary project TIGER (*Deep Geothermal Energy - acceptance and communication of an innovative technology*). The TIGER-project investigates the public awareness and acceptance for geothermal systems and aims at the development of communication concepts as aids for future geothermal projects.

Based on empirical acceptance research a modular communication concept is developed that provides communication measures and recommendations for every implementation phase of geothermal power stations as well as for single incidents (for details see [7]). Dependent on the project phase and kind of incident, different communicative activities are necessary and suitable, e.g. intensive information activities for the phase's *preparation* and *exploration*. Furthermore, depending on the target audience and topics, different communication measures are suitable.

The communication concept builds on a modeling of factors and measures relevant for the acceptance of geothermal energy which were determined empirically and can be described as a modular set combining goals and instruments (see Figure 1) (for details concerning the empirical studies see [1], [8], [9]).

The empirical studies show that knowledge, trust, and transparency are crucial factors for the acceptance of

complex technologies—such as deep geothermal energy—by the public. Thus, stakeholders should aim at these goals when introducing and implementing new projects. To achieve these goals, informing and including the public by different measures is necessary.

The target audiences prefer and demand information through different media (e.g. Internet, regional press and leaflets/mailshots) and about different topics such as (technology) risks, economical or ecological aspects [9], [10]. Furthermore, to include the local public, a local identity, active forums for discussion and opportunities to co-determine should be created.

Against this background, the aim of the present study is to examine if and how Facebook and specific Facebook components can be used in communicative measures and thus contribute to the goals sketched above. The study is guided by the following research questions:

RQ1: What are the opportunities and risks of using Facebook in communicative measures?

RQ2: Which communicative activities and purposes are specific Facebook components such as *fan pages, groups* and *events* suited for?

RELATED WORK

In communication studies, research on the use of Facebook by companies mostly focuses on public relation activities and communications of major companies with high turnovers, e.g. [11].

Linguistic research into Facebook focuses on private users and the private usage of Facebook analyzing texts concerning their specific linguistic features, e.g. [12], [13], [14]. The professional communication via Facebook (e.g. *fan pages*) is hardly analyzed from a linguistic point

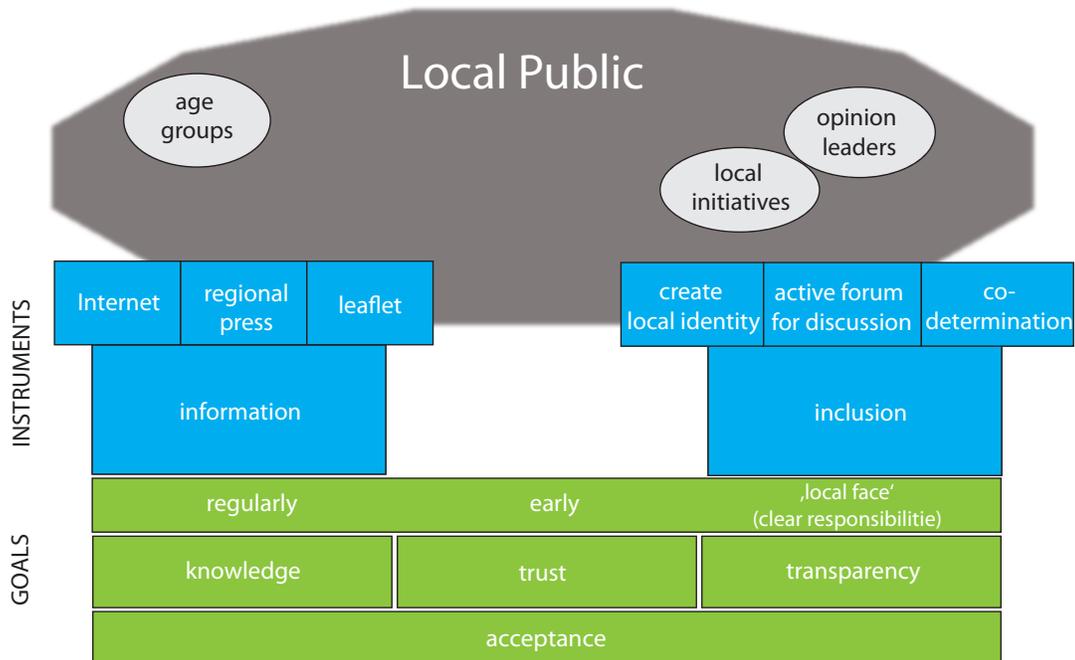


FIGURE 1: MODULAR CONCEPT OF MEASUREMENTS FOSTERING ACCEPTANCE OF GEOTHERMAL PROJECTS.

of view, but mostly regarded in manuals written by (public relation) practitioners lacking a scientific foundation, e.g. [15].

The communication of geothermal projects was investigated in another German research project from 2011 to 2014. The project was entitled “Public relations for geothermal projects. Evaluation and optimization of public relations in geothermics”. The outcome of the project was a publicly available guide to support the planning and realization of public relation measures for geothermal projects [16]. The project focused on traditional media. Thus, social media and particularly Facebook only play a secondary role in the guide. ENERCHANGE cites that communication processes around geothermal projects primarily take place locally as the reason for social media usage in exceptional cases only [16].

Nevertheless, especially Facebook has a high potential for the transfer of local communication processes into an online environment because users’ online social ties strongly reflect their offline social networks [17]. People often gather online with people from their social or local offline surroundings, e.g. in place-related groups. Thus, in this study the potential of Facebook for the communication of geothermal projects is examined and discussed from a theoretical perspective.

THEORETICAL FOUNDATION

Facebook is a social networking site (SNS) which are defined as “web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system” [18]. Beer further specifies that only those web sites should be regarded as SNS that satisfy the criteria listed by Boyd and Ellison and which primary purpose is building and maintaining relationships/social networks [19]. As a social networking site, Facebook is a communication and interaction environment with specific characteristics, which are described hereafter.

I. Facebook as a communication and interaction environment

Boyd conceptualizes SNS as “environments where people can gather publicly through mediating technology” [20]. She calls them *mediated publics* and assumes that these environments differ from non-mediated publics (e.g. parks, cafés) in four distinguishing features: persistence, searchability, replicability and scalability. *Persistence* refers to the fact that communication is saved and secured and can still be regained after several years. The feature *searchability* describes the fact that people and content can be searched and found but also that it is verifiable if and when someone is lingering in this environment

(through the display of availability or time stamps on postings). Furthermore, conversations on SNS are replicable: Content can be copied and pasted or shared into another context (*replicability*). Thus the original context is often not identifiable or reconstructable. *Scalability* concerns the potentially high visibility and range of content [6].

Later on, Boyd specifies the concept of mediated publics to networked publics so that the term “public” not only implies the (virtual) environment but also the people involved (the audience): “*Networked publics* are publics that are restructured by networked technologies. As such, they are simultaneously (1) the space constructed through networked technologies and (2) the imagined collective that emerges as a result of the intersection of people, technology, and practice” [6].

The features of mediated or networked publics described above affect the communication and interaction on SNS. Boyd [6] outlines three aspects: invisible audiences, collapsed contexts and the blurring of public and private.

On SNS *invisible audiences* come into being because parts of the communicative activities are visible for target audiences that are not immediately involved: wall postings and comments are not only visible for the addressee but also for friends and even for their circle of friends. If content is liked or shared the target audience expands even more and is no longer manageable or controllable for the original producer of a posting.

Furthermore, the boundaries of usually separated social contexts (e.g. family, friends, colleagues) blur and collide. Communicative and social norms and rules that are valid for one context may not apply for another. However, postings on walls are visible for the whole social network. This lack of spatial, social, and temporal boundaries makes the maintenance of specific social ties and contexts more difficult. Boyd discusses this phenomenon as *collapsed contexts* [6].

The third aspect *blurring of public and private* refers to the fact that the boundaries between what is private and what is public are no longer clear. Before SNS, public and private were mostly regarded as opposing concepts. Nowadays, they have to be more differentiated: Users have the opportunity to distribute private information to an extended target audience (semi-publicly). They publish postings with private information but the accessibility and visibility are only hardly controllable [6].

II. Facebook components and their communicative constellations

Facebook offers different components for different purposes and communicative activities. Besides components that are primarily directed at private users (profile and corresponding communication options such as chat), Facebook offers components for non-private users such as fan pages as well as components that can be

used by private *and* non-private users such as groups and events.

Fan pages are profiles of companies, organizations or VIPs. Facebook differentiates between six main categories with several sub-categories. German fan pages concerning geothermal energy for instance mostly belong to the categories “company or institution, organization”, “non-profit organization” or “place”. Independently from the category, fan pages include modules for information, pictures, private messages and a wall. Beyond that, fan pages can be individually modified and enhanced with other modules (e.g. games, surveys). The connection between fans/subscribers and fan pages are unidirectional. Fans/subscribers receive articles from the fan pages’ wall as news and are able to post comments onto the wall. However, comments from the fan pages’ wall are not distributed as news.

Groups are Facebook components where people can virtually gather. They can be focused on topics, locations or cliques. Groups can be public, closed or secret. The creator or administrator can determine accessibility and visibility of the group. Furthermore, there are options to control postings within the group. Group members can communicate via private messages, chat, and wall-postings with comments.

Events are Facebook components that allow users to publish information (time, place, details) concerning (offline) events and invite other Facebook members. Target audiences can be defined and limited (public, open invitation, guest & friends, invitation only). Invited Facebook members can respond to an invitation by joining, declining or clicking “maybe”.

From a linguistic perspective fan pages, groups and events can be described as instances of communicative forms. Communicative forms are communicative constellations that are characterized by situative and medial parameters such as “asynchronous vs. synchronous”, “written vs. spoken”, “public vs. private”, “monologic vs. dialogic” [21].

All discussed Facebook components are dominantly asynchronous, written computer mediated communicative forms. However, they vary concerning their degree of public accessibility. Furthermore, in the context of SNS there is a novel aspect of the public accessibility to take into consideration: the variability of public accessibility and the users’ control over it [22].

Formerly, the analytic category *public accessibility* was mainly conceptualized as dichotomous with “public” and “non-public” as the possible poles (see e.g. [23]). One special quality of Facebook is that users can change between public and non-public communication without changing the communicative environment. Other communicative forms, e.g. email or homepage are determinate concerning their degree of public accessibility. Users have to change the communicative environment if they want to transfer a public conversation

into a non-public and vice versa. In the communicative environment, Facebook users can either change the communicative form, e.g. from wall conversations to private messages or they can choose an audience (set a public status) for every single posting.

As described above, fan pages and groups themselves consist of different modules. Central for both components are walls. In the case of fan pages there are no options to restrict the accessibility: they are equally visible to all Internet users. In the case of groups there are different visibility options, but the accessibility is always restricted to Facebook members. Thus, groups are semi-public. The same applies to events (see Figure 2).

		Degree of public accessibility		
		public	semi-public	non-public
Variability	constant	fan pages		chat private messages
	variable		groups (P) events (P) status update (P) wall posting (A)	

P= Posting producer/creator controls the degree of public accessibility
A= Addressee controls the degree of public accessibility

FIGURE 2: DEGREE AND VARIABILITY OF PUBLIC ACCESSIBILITY FOR DIFFERENT FACEBOOK COMPONENTS.

The degree of public accessibility decisively influences the control users have over the content they publish and is closely related to the range of content/information. The degree of control declines with the degree of public accessibility. From the regarded Facebook components fan pages are the most public communicative forms.

Concerning the parameter “monologic vs. dialogic”, the communicative practices of Facebook users should be taken into consideration. The regarded components have a wall (pinboard, guest book) as dominant communication feature, which is predominantly suited for monologic communication. Although, due to commentary functions dialogic communication activities can develop [13]. Depending on the component, different communicative practices are customary: groups are rather used as discussions forums. People post questions and opinions onto group walls and other group members answer and comment to them. Events have to be regarded as rather monologic components: An event is announced and people have the opportunity to post onto the wall and comment on the event but it is rather unusual that dialogic communicative sequences develop. Fan pages are in between: fan pages essentially provide information about brand, company or persons of public interest (typical for monologic forms). Beyond that, some fan pages’ walls are used very actively as discussion forums as well while others are purely used as pinboard and therefore are rather monologic.

Communicative forms are per se multifunctional. They are not determined concerning a specific communicative

function. However, due to their communicative constellations and users' communicative practices the discussed Facebook components show affinities towards specific communicative purposes (see Figure 3). Events are for instance specifically suited to provide information (about events). Groups are rather suited for discussions due to the custom of using the group wall as a discussion forum. Fan pages with their specific constellation of different modules allow for self-presentation (through information, pictures or additional individual modules), information (through status updates/posts that all followers receive as news) as well as discussions (on the fan page wall).

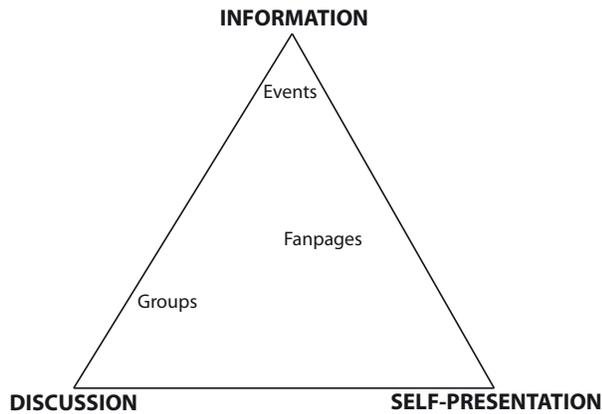


FIGURE 3: FACEBOOK COMPONENTS AND THEIR AFFINITY TOWARDS SPECIFIC COMMUNICATIVE FUNCTIONS.

Up to this point, Facebook and the components fan pages, groups and events have been described theoretically founded. In the next sections, the suitability of Facebook in the context of geothermal projects is discussed against this background. First, the opportunities and risks of Facebook usage as a communicative measure are discussed. Afterwards, it is outlined how Facebook components can be deployed in communication measures.

DISCUSSION OF FACEBOOK IN COMMUNICATIVE MEASUREMENTS FOR GEOTHERMAL PROJECTS

I. Opportunities and risks of Facebook usage

Facebook has a high potential for communication concepts and related measures – especially for specific target groups. As Trevisan et al. show, mostly well-educated, technology-interested, middle-aged, married men talk about geothermal projects on Facebook [24]. Thus, this target group can generally be reached and addressed through Facebook. However, it should be considered that only parts of the local public affected by a geothermal project use Facebook.

Using Facebook in communicative measures for geothermal projects gives stakeholders the opportunity to inform interested and affected citizens about geothermal

energy, specific ongoing projects and local events (e.g. earthquakes). As studies concerning the general usage of Facebook show, the platform is not primarily regarded as an information tool but as a tool for the maintenance of (private) social relationships [22]. Thus, Facebook is not the right place to provide great amounts of information, e.g. basic knowledge such as information about geothermal energy, geology, or the applied technology. Nevertheless, Facebook offers opportunities to provide this information indirectly via hyperlinks to external information sources (e.g. stakeholders' websites).

Users also apply Facebook as a source for information: for active information seeking processes as well as being informed passively (through news in the news stream) [25]. Facebook users' information related activities focus on information affecting their personal life and information concerning current events. Therefore, Facebook is a suitable way for the distribution of information concerning current events and to keep people up-to-date, e.g. with regard to ongoing projects.

Another potential of Facebook usage in the context of geothermal projects is the possibility to create and signalize transparency and openness to dialogue. Facebook is a platform to present oneself and engage in conversations via different components (e.g. private messages, walls, groups). The presence on the platform can be interpreted as the stakeholders' offer for contact and exchange with citizens and therefore be beneficial for the stakeholders' image. Whether this potential benefit is fully exploited or at worst turns into a risk depends on the individual behavior and how careful the Facebook appearance is handled (see below).

The opportunities discussed so far arise from an active participation on the platform. In addition, Facebook can be used to monitor discourses around specific projects or current events. Many local initiatives in Germany use Facebook to gather and discuss online in groups, organize themselves via events and distribute information. Currently, a large part of the German fan pages on geothermal energy are run by local initiatives that provide articles, background information, and mostly critical voices and opinions on the subject (e.g. "Local Initiative Alternative Energy Sources" or "Local Initiative against Deep Geothermal Energy Meiningen"). As described above, fan pages are public sites within Facebook and can therefore be monitored without further expenditure. In case false information is published and circulating, the stakeholder has a chance to directly intervene and correct.

The monitoring of groups is more difficult due to the different degrees of public accessibility (see above). Stakeholders can only monitor public groups or those they create and manage themselves. Until now, German groups focusing on geothermal energy are only run by interest groups supporting (e.g. "Geothermal energy – the Alternative for Nuclear Energy") or against geothermal energy (e.g. "Stop the Geothermal Smell in Pullach!!!").

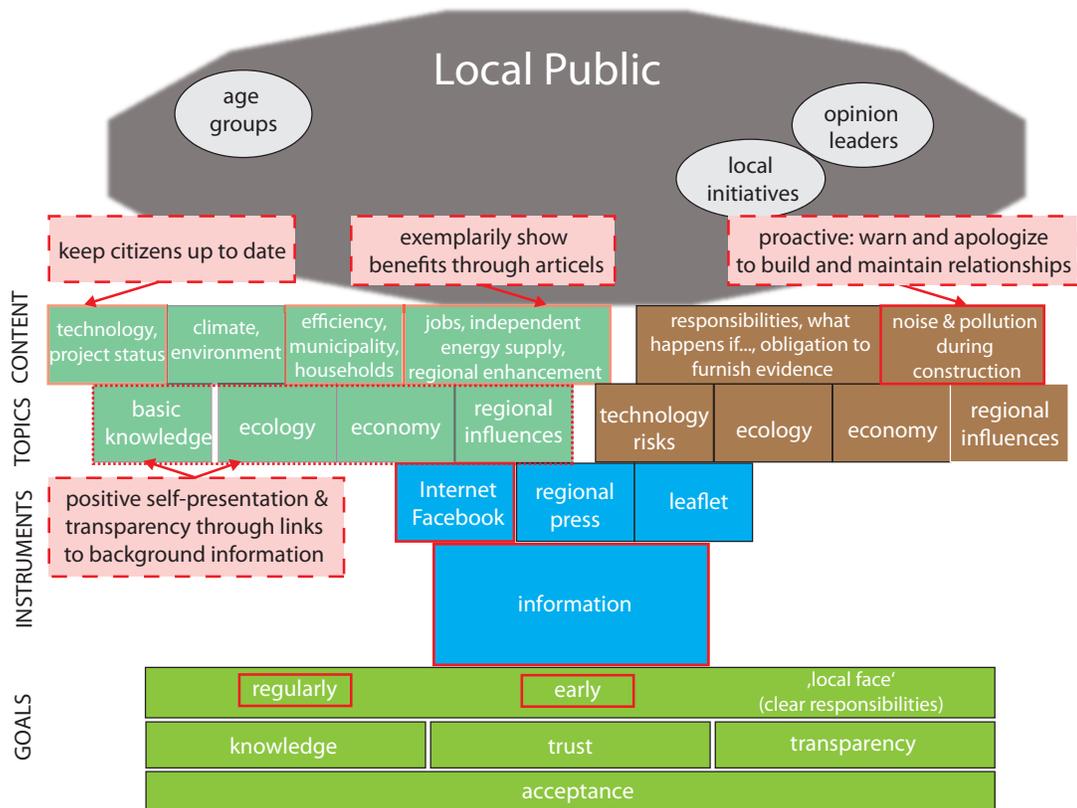


FIGURE 4: RECOMMENDATIONS FOR FANPAGES AS INSTRUMENT FOR INFORMATION.

Stakeholders in geothermal projects run not a single public or closed group.

The usage of Facebook in communication measures also entails risks and drawbacks that could lower the acceptance of geothermal projects instead.

One general risk of Facebook usage is the loss of control over distributed information. As described by Boyd the content posted in SNS can be taken out of the context it was produced in, pasted elsewhere (replicability) and has a high range (scalability) [6]. Therefore, stakeholders have to be careful about what information they provide on Facebook and consider if or how the content they provide could be misused, distorted or mistaken in other contexts.

The misuse of information, out-of-date content, one-sided or whitewashed information or inadequate reactions to critical comments could cause damages to the stakeholder's reputation. In fast-moving environments like Facebook it is of crucial importance that information and content are up-to-date. An up-to-date appearance on Facebook is a sign of quality, caring and attention. A neglected appearance signalizes the opposite and damages the stakeholders' image.

One-sided or whitewashed information is likely to become unmasked in Internet environments because there are many sources available to check, verify, or disprove information. Furthermore, in the case of geothermal

projects it is probable that online addressed citizens have additional offline information sources as well. Thus, providing whitewashed, one-sided, or even false information could result in a loss of trust and credibility.

Former cases, e.g. of the food company Nestlé, have shown that false information and inadequate reactions to criticism can cause flame wars or – as it is called in Germany – “shit storms” [26].

In the next chapter it is outlined which Facebook components are suited for which specific communicative tasks in the context of geothermal projects.

II. Communicating geothermal projects via fan pages, events and groups

Facebook components differ in their potential for different kinds of communicative activities and purposes:

Fan pages are components that are well suited for the distribution of news. As described above, fan pages are public and potentially have a high range so that content can be widely spread. Interested citizens can subscribe to the fan page to receive news, e.g. about project steps and phases, current local events (e.g. panel discussions, test drilling) or even incidents (e.g. earthquakes). In case of incidents or unpleasant concomitants of the project, such as noise or pollution during the construction phase, the fan page can be used for proactive as well as reactive communication. Proactive communicative activities such

as warning (in advance) and apologizing for inconveniences help building and maintaining relationships with local residents.

Furthermore, besides these kinds of information activities that are bound to specific occasions, fan pages can be used to provide information that is continuously relevant, e.g. background information on the geothermal processes and technology, economical or ecological consequences. As described above, fan pages are not suited for great amounts of information. Nevertheless, there are also some opportunities for information purposes: the “About”-section can be used to post hyperlinks to websites with background information. In addition, the wall can be used to share external articles about relevant topics from independent sources. In doing so, the stakeholder shows willingness to offer citizens background knowledge (transparency). Articles on the fan page wall can also be used to promote local or regional benefits that result from the geothermal projects, e.g. jobs that result from the project or other regional enhancements. Such economical or social conditions are often picked up and published by local newspapers, so the stakeholder just needs to share articles from time to time to exemplarily show the benefits of the geothermal project.

It is also possible to connect to (follow) other institutions (fan pages) as a fan page. The connection with associations or research institutions with a good reputation can positively contribute to the stakeholders’ image. Other image building measures can be carried out

with the help of further modules enhancing the core page (see above). Such enhancements can be used to integrate content that positively contributes to the stakeholders’ image, e.g. games, competitions or surveys.

If fan pages are used in the described way they contribute to building knowledge, trust and transparency concerning a specific geothermal project. Figure 4 summarizes the recommendations concerning fan pages and integrates them into the modular conceptualization of acceptance supporting measures.

Events are suited to announce offline events such as project- or topic-related panel discussions. As described above they are primarily monological components that are suited to provide event related information and allow for the invitation of different target groups. By announcing offline events on Facebook, transparency is signaled and the opportunity for participation is given.

As described previously, *groups* allow for communication and interaction in a protected environment: Members and postings can be controlled and the degree of public accessibility can be freely determined. The wall in groups functions as a discussion forum. Posting at group walls are not displayed in the news stream of friends, that is to say there are no invisible audiences in groups in the sense of Boyd [6].

Thus, groups are suitable for discussions, to include citizens into the dialogue around geothermal projects and to give them an opportunity to participate. Best suited for this purpose are closed groups: closed groups can be found on Facebook by interested citizens (in contrast to

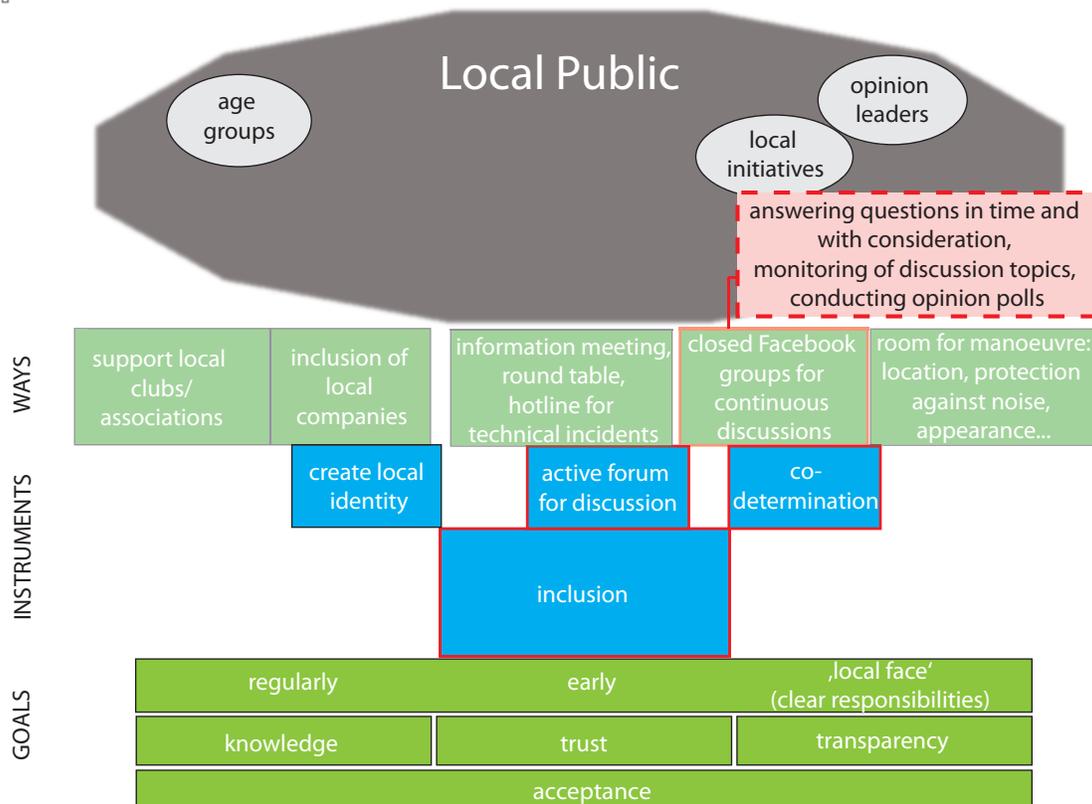


FIGURE 5: RECOMMENDATIONS FOR FACEBOOK GROUPS AS INSTRUMENTS FOR INCLUSION

secret groups) but the access can be controlled by the administrator (in contrast to open groups). As an asynchronous communicative form the discussion forum is well suited for citizens' questions concerning a planned or ongoing geothermal project, e.g. concerning consequences for the local environment or technology risks. Questions that arise in the population can be posted in the discussion forum and be answered by the stakeholder soon and with consideration. In this way, the group functions as a continuous panel discussion and allows for monitoring the questions and topics that affected people are preoccupied with. Furthermore, it can be used to conduct opinion polls.

Groups have a rather low range and require that people actively join the group. Thus, groups are a communicative measure that aims at a rather small group of interested and active citizens but not at the general population.

In each case, it has to be considered whether the resources (labor hours) for the maintenance of an own group are available on the stakeholders' site. If there is no one available with enough time and social media expertise to monitor, manage and maintain the discussion group, the creation of a group could cause damage to the stakeholders' reputation.

If groups are applied in the described way they are instruments for the inclusion of citizens into geothermal projects. Figure 5 shows Facebook groups as communication measure among other offline measures for inclusion (within the broken line specific recommendations are summarized).

CONCLUSION

Facebook can be used as one element in a cross- or multimedial-communication and information concept for geothermal projects. However, it should not be the central element. Facebook activities as part of a comprehensive communication concept should include monitoring measures and active communication measures.

Facebook components are suited for information as well as inclusion purposes. With regard to information purposes they are specifically adequate for the communication of news. Furthermore, Facebook allows stakeholders to create and signalize transparency and openness to dialogue. If Facebook is applied with consideration and care it can be a useful instrument communicating complex technologies and contribute to their acceptance in the public. However, communicative measures should be adjusted task-, phase- and stakeholder-specific.

LIMITATIONS AND OUTLOOK

Communicative measures that include Internet platforms like Facebook always have to be considered as limited to parts of the target audience. Only Facebook users can be addressed via the platform and although

approximately 44% of the German population are Facebook users [4], they only make up a part of the affected citizens.

The recommendations given above are theoretically based and derived. It has to be examined empirically if users regard Facebook as an adequate platform for the information and communication around geothermal projects and thus if the measures in fact foster acceptance in the assumed way.

Another limitation arises from the research case regarded in this study: The recommended measures should in principle be transferable to other energy forms as well. Nevertheless, in future studies it should be investigated if the measures can be usefully applied to other energy forms such as wind energy. Geothermal energy and the knowledge about this form of renewable energy is relatively unknown to the public whereas other forms might be better-known and thus require other measures.

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